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| (21)Application number : | 2000-112942 | (71)Applicant : | MITSUBISHI ELECTRIC CORP |
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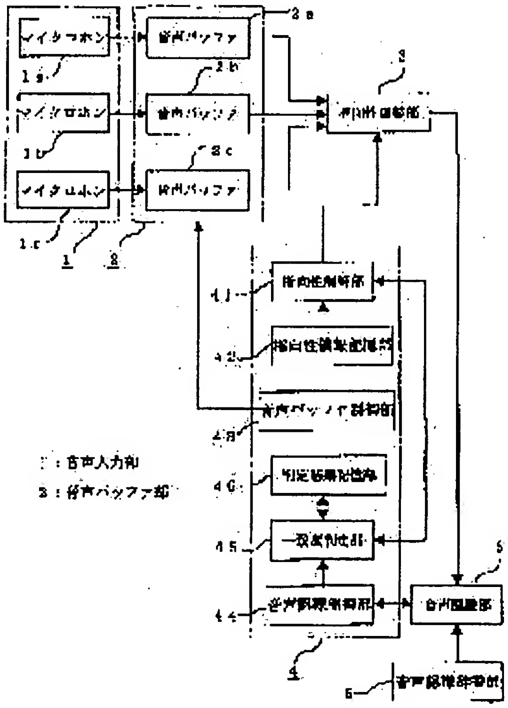
## (54) METHOD AND DEVICE FOR VOICE RECOGNITION

(57)Abstract:

PROBLEM TO BE SOLVED: To cope with the uttering of speakers located in plural directions without utilizing a switch for speaker discrimination.

SOLUTION: Keyword input signals from a voice input section 1 are stored in a voice buffer section 2. A directivity adjusting section 3 changes the directivity of the signals and a voice recognition section 5 conducts recognition processes for the signals. A degree of agreement discrimination section 45 discriminates a directivity having high degree of agreement among the recognition results. By setting the directivity, excellent voice recognition is attained.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1：音声入力部
2：音声バッファ部

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the voice recognition equipments for [ which recognizes the vocabulary of the input directions given to the control object equipment controlled by a sound ] mount.

[0002]

[Description of the Prior Art]Drawing 8 is a block diagram showing the system configuration of the conventional voice recognition equipment for mount. Hereafter, it explains according to figures. In order to face operating a navigational device, audio equipment, etc. during operation of vehicles etc. and to ease the burden of the driver by an operation switch, the sound which speakers (speaking person), such as a driver, uttered is recognized, and the connected apparatus has voice recognition equipment which carries out input directions.

[0003]1 is a voice input part which changes into an electrical signal the sound which the speaker uttered, and consists of two or more indirectional microphones 1a-1c. 3 is a directive controller for outputting the audio signal which adjusted the signal detected with the microphones 1a-1c, and adjusted the directivity of the voice input part 1 in the direction of a speaker. 5 is the voice recognition part connected to input parts, such as a navigational device and audio equipment. 8 is a direction detecting means which detects the direction of a speaker, and detects the direction of audio from the angle Sagitta seat slide position of a room mirror, the degree of reclining angle, etc. 41 is a directive control section which controls the directive controller 3 based on the detection result of the direction detecting means 8.

[0004]Next, operation is explained. Drawing 9 is a flow chart which shows the activity of the conventional voice recognition equipment for mount. In Step S0, operation of a speech recognition start is performed first. Next, in Step S1, the direction of a speaker is detected by the direction detecting means 8, and a speaker's position information is acquired. Next, in Step

S2, the directive controller 3 is controlled so that the directive control section 41 changes directivity in the direction of a speaker based on a speaker's position information acquired at Step S1. Next, in Step S3, a speaker's sound is inputted from the microphones 1a-1c. Then, in step S4, the voice recognition part 5 performs recognition processing to the sound with which the directive controller 3 changed directivity. And in Step S5, a recognition result is outputted from the voice recognition part 5.

[0005]

[Problem(s) to be Solved by the Invention]In conventional voice recognition equipment, since a speaker's position is pinpointed when adjusting directivity, a means to detect the direction of a speaker is needed. Conventionally, in for mount, it detected from the angle Sagitta seat slide position of a room mirror, the degree of reclining angle, etc. as this direction detecting means. Therefore, it will be limited to a speaker being a driver, and when becoming a speaker except a driver, it cannot detect in the above-mentioned direction detecting means. When detecting the sound by making it into a speaker also except a driver, since the composition of a direction detecting means must not only become complicated, but it must detect who speaks, the switch for speaker distinction, etc. are needed as the means. When these composition is realized, the specified directivity is not necessarily the characteristic that high performance is obtained in speech recognition processing.

[0006]An object of this invention is to reduce noises other than a speaker's sound, and to raise speech recognition performance, and to provide the high voice recognition method of convenience which can respond without the switch for speaker distinction also to utterance of the speaker who exists in two or more directions, and a device.

[0007]

[Means for Solving the Problem]A sound buffer part where voice recognition equipment concerning claim 1 saves a signal from a voice input part and a voice input part, A directive controller which generates a signal which changed directivity from a signal saved in a sound buffer part, A voice recognition part which performs speech recognition processing to a signal which changed directivity by a directive controller, A sound buffer control section which reproduces a signal saved in a sound buffer part, A directive information storage part which memorized two or more directive information changed in a directive controller, A directive control section which chooses one from directive information memorized by directive information storage part, and controls a directive controller, A speech recognition dictionary part which memorized a recognition object in a voice recognition part, and a speech recognition control section which controls a voice recognition part and carries out multiple-times execution of the recognition processing, It has a decision result storage parts store which memorizes the degree of coincidence of a changed recognition result directive [ two or more ], and a coincidence degree judgment part which judges directivity with the highest degree of coincidence out of a recognition result memorized by decision result storage parts store.

[0008]A sound buffer part where voice recognition equipment concerning claim 2 saves a signal from a voice input part and a voice input part, A directional gain controller which generates a signal which changed directivity and a profit from a signal saved in a sound buffer part, A voice recognition part which performs speech recognition processing to a signal which changed directivity and a profit by a directional gain controller, A sound buffer control section which reproduces a signal saved in a sound buffer part, A directional gain information storage part which memorized two or more directive information and profit information which are changed in a directional gain controller, A directional gain control section which chooses one each from directive information and profit information which were memorized by directional gain information storage part, and controls a directional gain controller, A speech recognition dictionary part which memorized a recognition object in a voice recognition part, and a speech recognition control section which controls a voice recognition part and carries out multiple-times execution of the recognition processing, The degree of coincidence is provided with a coincidence degree judgment part which judges the highest directivity and a profit out of a recognition result memorized by a decision result storage parts store which memorizes the degree of coincidence of a recognition result in two or more directivity and a profit which were changed, and decision result storage parts store.

[0009]When a step and a keyword which judge whether a voice recognition method concerning claim 3 performed recognition processing to an inputted audio signal, and a certain keyword has been recognized have been recognized, Two or more recognition processings which changed directivity to an audio signal of the keyword are performed, It has a step which obtains the degree of coincidence of each recognition result, a step which judges directivity with the highest degree of coincidence out of these recognition results, and a step which sets it as this judged directivity and performs subsequent speech recognition.

[0010]When a step and a keyword which judge whether a voice recognition method concerning claim 4 performed recognition processing to an inputted audio signal, and a certain keyword has been recognized have been recognized, Two or more recognition processings which changed directivity and a profit to an audio signal of the keyword are performed, It has a step which sets it as a step which judges directivity and a profit with the highest degree of coincidence, this judged directivity, and a profit out of steps which obtain the degree of coincidence of each recognition result, and these recognition results, and performs subsequent speech recognition.

[0011]

[Embodiment of the Invention]Below embodiment 1. describes this embodiment of the invention about the voice recognition equipment for mount. Drawing 1 is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 1. In a figure, 1 is a voice input part which changes into an electrical signal (it is hereafter called an audio signal) the sound which the speaker uttered, and consists of the microphones 1a-1c of indirectional plurality (here three). Drawing 2 is a top view showing the example of the attaching position of the microphone to vehicles. Within the vehicles 11, the three microphones 1a-1c are installed so that a triangle may be made at equal intervals to a dashboard 12 Uenaka center section. For example, it becomes possible by adjusting the gain balance of each output signal of the microphones 1a-1c to change directivity in the front, driver's seat 13 direction, or the passenger seat 14 direction.

[0012]It returns to drawing 1, and 2 is a sound buffer part which saves the audio signal from the voice input part 1, and consists of two or more sound buffers 2a-2c provided corresponding to the microphones 1a-1c, respectively. The directive controller which outputs the audio signal which 3 adjusted the audio signal saved in the sound buffer part 2, and changed directivity, 5 is a voice recognition part which performs speech recognition processing to the audio signal which had directivity changed by the directive controller 3, and outputs the degree of coincidence with the data saved in the speech recognition dictionary part 6 stated to a recognition result and the next. 6 is a speech recognition dictionary part which memorizes a recognition object, and the data used as the standard in speech recognition processing of the voice recognition part 5 is saved.

[0013]The control section by which 4 controls the sound buffer part 2, the directive controller 3, and the voice recognition part 5, The sound buffer control section by which 43 controls preservation and reproduction of the audio signal in the sound buffer part 2, The directive control section by which 41 controls the directive change by the directive controller 3, and 42 are directive information storage parts which memorize two or more directive information for the directive control by the directive control section 41, For example, a transverse plane shall be 0 degree, even **90 degrees is memorized at intervals of 5 degrees, and the directive control section 41 chooses one at a time from them, and controls. The speech recognition control section to which 44 performs the start of the recognition processing of the voice recognition part 5, a stop, and acquisition of a recognition result and the degree of coincidence, 45 from the recognition result and the degree of coincidence from the directive information and the speech recognition control section 44 from the directive control section 41. The coincidence degree judgment part which judges which directivity is the optimal, and 46 are decision result storage parts stores which memorize the decision result in the recognition result, the degree of coincidence, and the coincidence degree judgment part 45 in a voice recognition part, and the control section 4 consists of the above 41-46.

[0014]Next, operation is explained. Drawing 3 is a flow chart which shows the activity of the voice recognition equipment shown in drawing 1. In Step A0, initialization of each part of the control section 4 and start operation of processing are performed first. Next, in Step A1, directive setting out of the directive controller 3 is set as indirectivity by control from the directive control section 41. Next, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal in Step A2 is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, this audio signal is inputted into the directive controller 3 set as indirectivity, and the output of the directive controller 3 is inputted into the voice recognition part 5. In the voice recognition part 5, the keyword used as the start command of voice operation, for example, the processing which recognizes "a recognition start", is performed by control from the speech recognition control section 44 to the inputted audio signal.

[0015]Next, in step A3, based on the recognition result of the voice recognition part 5, the speech recognition control section 44 returns to Step A2, when it judges whether the keyword "a recognition start" has been recognized and it has not been recognized, and it performs voice input processing and keyword recognition processing again. When recognized, it progresses to step A4. Next, when it progresses to step A4, by control from the sound buffer control section 43, the voice input to the sound buffers 2a-2c is suspended, and the audio signal when the keyword "a recognition start" has been recognized is stored.

[0016]Next, in step A5, by control from the directive control section 41, the directive information storage part 42 memorized, for example, directive setting out of the directive controller 3 is set up in the direction of 0 degree of transverse planes. Next, the audio signal of the keyword "a recognition start" stored in the sound buffers 2a-2c by step A4 in Step A6, Reproduce by control from the sound buffer control section 43, and an audio signal with the directivity which the directive control section 41 set up by the directive controller 3 is generated, Keyword recognition processing is again performed by the voice recognition part 5, and the speech recognition control section 44 acquires the result of recognition processing, and the degree of coincidence from the voice recognition part 5, and transmits to the coincidence degree judgment part 45. The coincidence degree judgment part 45 transmits to the decision result storage parts store 46, and makes the directive information, the recognition result, and the degree of coincidence which are set up now memorize.

[0017]Next, in Step A7, when the new recognition processing about all the directivity and the acquisition of a recognition result and the degree of coincidence which were memorized by the directive information storage part 42 are not completed, it returns to step A5, and it repeats until it ends about all the directivity memorized by the directive information storage part 42. When new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the directivity, it progresses to Step A8.

[0018]Next, the recognition result about all the directivity and the degree of coincidence to the coincidence degree judgment part 45 memorized by the decision result storage parts store 46 when it progressed to Step A8, Judging which a recognition result is a correct answer "a recognition start", i.e., a keyword, and is the directivity with the highest degree of coincidence, the directive control section 41 controls the directive controller 3 to become the directivity which the coincidence degree judgment part 45 judged.

[0019]Next, in step A9, the voice input to the sound buffers 2a-2c stopped by step A4 is resumed. Namely, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, an audio signal is inputted into the directive controller 3 which a recognition result is a correct answer at Step A8, and was set as directivity with the highest degree of coincidence, and the output of the directive controller 3 is inputted into the voice recognition part 5. In the voice recognition part 5, processing which recognizes the recognized vocabulary stored in the speech recognition dictionary part 6 by the control from the speech recognition control section 44 is performed to the inputted audio signal. Next, in Step A10, the voice recognition part 5 outputs the result of recognition processing, and operates the audio equipment besides a graphic display, etc. At Step A8, if the completion of recognition of a keyword "a recognition start" and a directive set direction are displayed with the display or lamp besides a graphic display, a speaker can check the display and the command which continues by step A9 can be inputted.

[0020]In the voice recognition method of Embodiment 1, and a device as mentioned above, In order to change directivity using the audio signal of the sound buffer at the time of having recognized the keyword "a recognition start", to judge the direction of a speaker from the degree of coincidence in speech recognition and to extract a speaker's sound, When the direction of a speaker has not become settled, it is possible to extract a speaker's sound effectively and to recognize it. Cost reductions of a speaker's direction detecting means, such as a switch for speaker distinction or a sensor for direction detection, become it is unnecessary and possible.

[0021]Embodiment 2. drawing 4 is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 2. According to this embodiment, in addition to the method of changing the directivity performed by Embodiment 1 and choosing the greatest thing of the degree of coincidence, the method of changing a gain change, i.e., a signal level, and seeing the degree of coincidence is used. In drawing 4, it replaced with the directive controller 3, the directive control section 41, and the directive storage parts store 42 of drawing 1, and the directional gain controller 31, the directional gain control section 47, and the directional gain storage parts store 48 are formed, respectively.

[0022]The directional gain controller which outputs the audio signal which 31 adjusted the audio signal held by the sound buffer part 2 in drawing 4, and changed directivity and a profit, The directional gain control section by which 47 controls the directivity in the directional gain controller 31, and change of a profit, While 48 is a directional gain information storage part which memorizes two or more directive information and two or more profit information in the directivity of the directional gain control section 47, and control of a profit, for example, makes a transverse plane 0 degree and memorizing even **90 at intervals of 5 degrees, The initial profit was 0 dB and even **15 dB is memorized at intervals of 3 dB.

[0023]The voice recognition part 5 performs speech recognition processing to the audio signal which had directivity and a profit changed by the directional gain controller 31. The coincidence degree judgment part 45 judges which directivity and profit are the optimal from the recognition result and the degree of coincidence from the directive information, profit information, and the speech recognition control section 44 from the directional gain control section 47. The control section 4 comprises 43-48. Since other portions are the same as that of drawing 1, explanation is omitted.

[0024]Next, operation is explained. Drawing 5 is a flow chart which shows the activity of the voice recognition equipment shown in drawing 4. In Step B0, initialization of each part of the control section 4 and start operation of processing are performed first. Next, in Step B1, the directivity of the directional gain controller 31 and a gain setting are set as indirectivity and an initial profit by control from the directional gain control section 47. Next, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal in step B-2 is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, this audio signal is inputted into the directional gain controller 31 set as indirectivity and an initial profit, and the output of the directional gain controller 31 is inputted into the voice recognition part 5. In the voice recognition part 5, the keyword used as the start command of voice operation, for example, the processing which recognizes "a recognition start", is performed by control from the speech recognition control section 44 to the inputted audio signal.

[0025]Next, in Step B3, based on the recognition result of the voice recognition part 5, when it judges whether the keyword "a recognition start" has been recognized and it has not been recognized, the speech recognition control section 44 returns to step B-2, and performs voice input processing and keyword recognition processing again. When recognized, it progresses to step B4. Next, when it progresses to step B4, by control from the sound buffer control section 43, the voice input to the sound buffers 2a-2c is suspended, and the audio signal when the keyword "a recognition start" has been recognized is stored.

[0026]Next, in step B5, by control from the directional gain control section 47, directive setting out of the directional gain controller 31 is set up in the direction of 0 degree of transverse planes, for example, the directional gain information storage part 48 memorized. Next, in step B6, the audio signal of the keyword "a recognition start" stored in the sound buffers 2a-2c by step B4 is reproduced by control from the sound buffer control section 43, An audio signal with the directivity which the directional gain control section 47 set up by the directional gain controller 31 is generated, keyword recognition processing is again performed by the voice recognition part 5, and the speech recognition control section 44 acquires the result of recognition processing, and the degree of coincidence from the voice recognition part 5, and transmits to the coincidence degree judgment part 45. The coincidence degree judgment part 45 transmits to the decision result storage parts store 46, and makes the directive information, the recognition result, and the degree of coincidence which are set up now memorize.

[0027]Next, when the new recognition processing about all the directivity and the acquisition of a recognition result and the degree of coincidence which were memorized by the directional gain information storage part 48 are not completed in Step B7, it returns to step B5, It repeats until new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the directivity memorized by the directional gain information storage part 48. When new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the directivity, it progresses to Step B8.

[0028]Next, the recognition result about all the directivity and the degree of coincidence to the coincidence degree judgment part 45 memorized by the decision result storage parts store 46 when it progressed to Step B8, Judging which a recognition result is a correct answer "a recognition start", i.e., a keyword, and is the directivity with the highest degree of coincidence, the directional gain control section 47 controls the directional gain controller 31 to become the directivity which the coincidence degree judgment part 45 judged.

[0029]Next, in Step B9, by control from the directional gain control section 47, the directional gain information storage part 48 memorized, for example, the gain setting of the directional gain controller 31 is set as a profit higher 3 dB than an initial profit. A profit shall be adjusted only about the directive direction the gain control in this case was judged at Step B8 to be.

[0030]Next, in Step B10, the audio signal of the keyword "a recognition start" stored in the sound buffers 2a-2c by step B4 is reproduced by control from the sound buffer control section 43, An audio signal with the directivity and profit which the directional gain control section 47 set up by the directional gain controller 31 is generated, keyword recognition processing is again performed by the voice recognition part 5, and the speech recognition control section 44 acquires the result of recognition processing, and the degree of coincidence from the voice recognition part 5, and transmits to the coincidence degree judgment part 45. The coincidence degree judgment part 45 transmits to the decision result storage parts store 46, and makes the directive information, the profit information, the recognition result, and the degree of coincidence which are set up now memorize.

[0031]Next, in Step B11, Until the new recognition processing and the acquisition of a recognition result and the degree of coincidence to all the profits which returned to Step B9 and were memorized by the directional gain information storage part 48 are completed, when the new recognition processing about all the profits and the acquisition of a recognition result and the degree of coincidence which were memorized by the directional gain information storage part 48 are not completed. It repeats. When new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the profits, it progresses to Step B12.

[0032]Next, the recognition result about all the profits and the degree of coincidence to the coincidence degree judgment part 45 memorized by the decision result storage parts store 46 when it progressed to Step B12, Judging which a recognition result is a correct answer and is the profit with the highest degree of coincidence, the directional gain control section 47 controls the directional gain controller 31 to become the directivity and profit which the coincidence degree judgment part 45 judged.

[0033]Next, in Step B13, the voice input to the sound buffers 2a-2c stopped by step B4 is resumed. Namely, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, an audio signal is inputted into the directional gain controller 31 which a recognition result is a correct answer at Step B12, and was set as directivity and a profit with the highest degree of coincidence, and the output of the directional gain controller 31 is inputted into the voice recognition part 5. In the voice recognition part 5, processing which recognizes the recognized vocabulary stored in the speech recognition dictionary part 6 by the control from the speech recognition control section 44 is performed to the inputted audio signal. Next, in Step B14, the voice recognition part 5 outputs the result of recognition processing, and controls the audio equipment besides a graphic display, etc.

[0034]In the voice recognition method of Embodiment 2, and a device as mentioned above, In order to judge the direction of a speaker using the degree of coincidence in speech recognition, and also to judge the optimal input signal level for the optimal profit, i.e., speech recognition, using the degree of coincidence in speech recognition and to extract a speaker's sound, When the direction of a speaker has not become settled, while extracting a speaker's sound effectively, even when the voice input levels to a microphone differ for the distance from a speaker to a microphone, etc., it is possible to perform recognition processing with the optimal input signal level for speech recognition. Cost reductions of a speaker's direction detecting means, such as a sensor for direction detection, become it is unnecessary and possible.

[0035]Embodiment 3. drawing 6 is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 3. This embodiment shows the example which controls a navigation device by a sound. In addition to what was shown in drawing 4, drawing 6 shows the navigation device 7. In drawing 6, 7 is a navigation device with which various operations are performed by the control section 4 based on the result of speech recognition. Since others are the same as that of drawing 4, explanation is omitted.

[0036]Next, operation is explained. Drawing 7 is a flow chart which shows the activity of the voice recognition equipment shown in drawing 6. Since Steps C0-C12 are the same as Steps B0-B12 of drawing 5, explanation is omitted. However, although drawing 5 explained the example of the keyword as "a recognition start", in drawing 7, another keyword, for example, "navigation", is used.

[0037]In Step C13 following Step C12, the voice input to the sound buffers 2a-2c stopped at Step C4 is resumed. Namely, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, an audio signal is inputted into the directional gain controller 31 which a recognition result is a correct answer at Step C12, and was set as directivity and a profit with the highest degree of coincidence, and the output of the directional gain controller 31 is inputted into the voice recognition part 5. In the voice recognition part 5, processing which recognizes "the control-commands vocabulary of the navigation device 7 stored in the speech recognition dictionary part 6 by the control from the speech recognition control section 44, for example, "a detailed display", a broader-based display", "destination setting", etc. is performed to the inputted audio signal.

[0038]Next, in Step C14, the speech recognition control section 44 acquires the recognition result of the voice recognition part 5, for example, "a detailed display", and transmits the control signal corresponding to a recognition result "a detailed display" to the navigation device 7. Next, in Step C15, processing which indicates the display screen by detailed according to the control signal corresponding to the recognition result "a detailed display" which the navigation device 7 received is performed.

[0039]In the voice recognition method of Embodiment 3, and a device as mentioned above, Change directivity using the audio signal of the sound buffer at the time of having recognized the keyword "navigation", and the highest directivity of the degree of coincidence in speech recognition is judged, In order to perform speech recognition processing after making this into the direction of a speaker and judging the highest profit of the degree of coincidence further, it becomes it is unnecessary and simple operating the start switch of speech recognition. In order to judge the highest directivity and profit of the degree of coincidence in keyword recognition processing, The direction of a speaker cannot be limited to a driver, but the voice operation from a passenger seat of it can also become possible, recognition processing can be performed on the optimal directivity and profit in future command recognition processings, and improvement in recognition performance is possible. Cost reductions of a speaker's direction detecting means, such as a sensor for direction detection, become it is unnecessary and possible.

[0040]

[Effect of the Invention]Since the degree of coincidence is provided with the coincidence degree judgment part which judges the highest directivity the voice recognition part which performs speech recognition processing to the signal which changed directivity, and out of the recognition result according to the voice recognition equipment concerning claim 1, Even when two or more speakers exist and the direction has not become settled by setting it as the directivity which the degree of coincidence judged by the coincidence degree judgment part to be the highest, he has a switch for speaker distinction, and no sensor, Noises other than a speaker are reduced, a speaker's sound can be extracted effectively, and voice recognition equipment with high speech recognition performance and high convenience is obtained.

[0041]Since it has the voice recognition part which performs speech recognition processing to the signal which changed directivity and a profit, and the coincidence degree judgment part which judges the highest directivity and profit of the degree of coincidence out of a recognition result according to the voice recognition equipment concerning claim 2, By setting it as the directivity and profit which the degree of coincidence judged by the coincidence degree judgment part to be the highest, The direction of a speaker does not become settled, and even when the input level to a voice input part (microphone) is large or small, he has a switch for speaker distinction, and no sensor, While extracting a speaker's sound effectively, recognition processing can be performed with a suitable signal level, and voice recognition equipment with high speech recognition performance and high convenience is obtained.

[0042]According to the voice recognition method concerning claim 3, two or more recognition processings which changed directivity to the audio signal of the recognized keyword are performed, Since speech recognition after judging directivity with the highest degree of coincidence out of that recognition result and setting it as this directivity is performed, Even when the direction of a speaker has not become settled, a speaker's sound can be extracted effectively and a voice recognition method with high speech recognition performance and high convenience is acquired without the switch for speaker distinction, or a sensor.

[0043]According to the voice recognition method concerning claim 4, two or more recognition processings which changed directivity and a profit to the audio signal of the recognized keyword are performed, Since speech recognition after judging directivity and a profit with the highest degree of coincidence out of that recognition result and setting it as this directivity and profit is performed, The direction of a speaker does not become settled, and even when the input level to a voice input part is large or small, he has a switch for speaker distinction, and no sensor, While extracting a speaker's sound effectively, recognition processing can be performed with a suitable signal level, and a voice recognition method with high speech recognition performance and high convenience is acquired.

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## TECHNICAL FIELD

[Field of the Invention]This invention relates to the voice recognition equipments for [ which recognizes the vocabulary of the input directions given to the control object equipment controlled by a sound ] mount.

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## PRIOR ART

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[Description of the Prior Art]Drawing 8 is a block diagram showing the system configuration of the conventional voice recognition equipment for mount. Hereafter, it explains according to figures. In order to face operating a navigational device, audio equipment, etc. during operation of vehicles etc. and to ease the burden of the driver by an operation switch, the sound which speakers (speaking person), such as a driver, uttered is recognized, and the connected apparatus has voice recognition equipment which carries out input directions.
[0003]1 is a voice input part which changes into an electrical signal the sound which the speaker uttered, and consists of two or more indirectional microphones 1a-1c. 3 is a directive controller for outputting the audio signal which adjusted the signal detected with the microphones 1a-1c, and adjusted the directivity of the voice input part 1 in the direction of a speaker. 5 is the voice recognition part connected to input parts, such as a navigational device and audio equipment. 8 is a direction detecting means which detects the direction of a speaker, and detects the direction of audio from the angle Sagitta seat slide position of a room mirror, the degree of reclining angle, etc. 41 is a directive control section which controls the directive controller 3 based on the detection result of the direction detecting means 8.
[0004]Next, operation is explained. Drawing 9 is a flow chart which shows the activity of the conventional voice recognition equipment for mount. In Step S0, operation of a speech recognition start is performed first. Next, in Step S1, the direction of a speaker is detected by the direction detecting means 8, and a speaker's position information is acquired. Next, in Step S2, the directive controller 3 is controlled so that the directive control section 41 changes directivity in the direction of a speaker based on a speaker's position information acquired at Step S1. Next, in Step S3, a speaker's sound is inputted from the microphones 1a-1c. Then, in step S4, the voice recognition part 5 performs recognition processing to the sound with which the directive controller 3 changed directivity. And in Step S5, a recognition result is outputted from the voice recognition part 5.

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## EFFECT OF THE INVENTION

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[Effect of the Invention]Since the degree of coincidence is provided with the coincidence degree judgment part which judges the highest directivity the voice recognition part which performs speech recognition processing to the signal which changed directivity, and out of the recognition result according to the voice recognition equipment concerning claim 1, Even when two or more speakers exist and the direction has not become settled by setting it as the directivity which the degree of coincidence judged by the coincidence degree judgment part to be the highest, he has a switch for speaker distinction, and no sensor, Noises other than a speaker are reduced, a speaker's sound can be extracted effectively, and voice recognition equipment with high speech recognition performance and high convenience is obtained.
[0041]Since it has the voice recognition part which performs speech recognition processing to the signal which changed directivity and a profit, and the coincidence degree judgment part which judges the highest directivity and profit of the degree of coincidence out of a recognition result according to the voice recognition equipment concerning claim 2, By setting it as the directivity and profit which the degree of coincidence judged by the coincidence degree judgment part to be the highest, The direction of a speaker does not become settled, and even when the input level to a voice input part (microphone) is large or small, he has a switch for speaker distinction, and no sensor, While extracting a speaker's sound effectively, recognition processing can be performed with a suitable signal level, and voice recognition equipment with high speech recognition performance and high convenience is obtained.
[0042]According to the voice recognition method concerning claim 3, two or more recognition processings which changed directivity to the audio signal of the recognized keyword are performed, Since speech recognition after judging directivity with the highest degree of coincidence out of that recognition result and setting it as this directivity is performed, Even when the direction of a speaker has not become settled, a speaker's sound can be extracted effectively and a voice recognition method with high speech recognition performance and high

convenience is acquired without the switch for speaker distinction, or a sensor.
[0043]According to the voice recognition method concerning claim 4, two or more recognition processings which changed directivity and a profit to the audio signal of the recognized keyword are performed, Since speech recognition after judging directivity and a profit with the highest degree of coincidence out of that recognition result and setting it as this directivity and profit is performed, The direction of a speaker does not become settled, and even when the input level to a voice input part is large or small, he has a switch for speaker distinction, and no sensor, While extracting a speaker's sound effectively, recognition processing can be performed with a suitable signal level, and a voice recognition method with high speech recognition performance and high convenience is acquired.

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## MEANS

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[Means for Solving the Problem]A sound buffer part where voice recognition equipment concerning claim 1 saves a signal from a voice input part and a voice input part, A directive controller which generates a signal which changed directivity from a signal saved in a sound buffer part, A voice recognition part which performs speech recognition processing to a signal which changed directivity by a directive controller, A sound buffer control section which reproduces a signal saved in a sound buffer part, A directive information storage part which memorized two or more directive information changed in a directive controller, A directive control section which chooses one from directive information memorized by directive information storage part, and controls a directive controller, A speech recognition dictionary part which memorized a recognition object in a voice recognition part, and a speech recognition control section which controls a voice recognition part and carries out multiple-times execution of the recognition processing, It has a decision result storage parts store which memorizes the degree of coincidence of a changed recognition result directive [ two or more ], and a coincidence degree judgment part which judges directivity with the highest degree of coincidence out of a recognition result memorized by decision result storage parts store.
[0008]A sound buffer part where voice recognition equipment concerning claim 2 saves a signal from a voice input part and a voice input part, A directional gain controller which generates a signal which changed directivity and a profit from a signal saved in a sound buffer part, A voice recognition part which performs speech recognition processing to a signal which changed directivity and a profit by a directional gain controller, A sound buffer control section which reproduces a signal saved in a sound buffer part, A directional gain information storage part which memorized two or more directive information and profit information which are changed in a directional gain controller, A directional gain control section which chooses one each from directive information and profit information which were memorized by directional gain information storage part, and controls a directional gain controller, A speech recognition

dictionary part which memorized a recognition object in a voice recognition part, and a speech recognition control section which controls a voice recognition part and carries out multiple-times execution of the recognition processing, The degree of coincidence is provided with a coincidence degree judgment part which judges the highest directivity and a profit out of a recognition result memorized by a decision result storage parts store which memorizes the degree of coincidence of a recognition result in two or more directivity and a profit which were changed, and decision result storage parts store.

[0009]When a step and a keyword which judge whether a voice recognition method concerning claim 3 performed recognition processing to an inputted audio signal, and a certain keyword has been recognized have been recognized, Two or more recognition processings which changed directivity to an audio signal of the keyword are performed, It has a step which obtains the degree of coincidence of each recognition result, a step which judges directivity with the highest degree of coincidence out of these recognition results, and a step which sets it as this judged directivity and performs subsequent speech recognition.

[0010]When a step and a keyword which judge whether a voice recognition method concerning claim 4 performed recognition processing to an inputted audio signal, and a certain keyword has been recognized have been recognized, Two or more recognition processings which changed directivity and a profit to an audio signal of the keyword are performed, It has a step which sets it as a step which judges directivity and a profit with the highest degree of coincidence, this judged directivity, and a profit out of steps which obtain the degree of coincidence of each recognition result, and these recognition results, and performs subsequent speech recognition.

[0011]

[Embodiment of the Invention]Below embodiment 1. describes this embodiment of the invention about the voice recognition equipment for mount. Drawing 1 is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 1. In a figure, 1 is a voice input part which changes into an electrical signal (it is hereafter called an audio signal) the sound which the speaker uttered, and consists of the microphones 1a-1c of indirectional plurality (here three). Drawing 2 is a top view showing the example of the attaching position of the microphone to vehicles. Within the vehicles 11, the three microphones 1a-1c are installed so that a triangle may be made at equal intervals to a dashboard 12 Uenaka center section. For example, it becomes possible by adjusting the gain balance of each output signal of the microphones 1a-1c to change directivity in the front, driver's seat 13 direction, or the passenger seat 14 direction.

[0012]It returns to drawing 1, and 2 is a sound buffer part which saves the audio signal from the voice input part 1, and consists of two or more sound buffers 2a-2c provided corresponding to the microphones 1a-1c, respectively. The directive controller which outputs the audio signal which 3 adjusted the audio signal saved in the sound buffer part 2, and changed directivity, 5 is a voice recognition part which performs speech recognition processing to the audio signal which had directivity changed by the directive controller 3, and outputs the degree of coincidence with the data saved in the speech recognition dictionary part 6 stated to a recognition result and the next. 6 is a speech recognition dictionary part which memorizes a recognition object, and the data used as the standard in speech recognition processing of the voice recognition part 5 is saved.

[0013]The control section by which 4 controls the sound buffer part 2, the directive controller 3, and the voice recognition part 5, The sound buffer control section by which 43 controls preservation and reproduction of the audio signal in the sound buffer part 2, The directive control section by which 41 controls the directive change by the directive controller 3, and 42 are directive information storage parts which memorize two or more directive information for the directive control by the directive control section 41, For example, a transverse plane shall be 0 degree, even **90 degrees is memorized at intervals of 5 degrees, and the directive control section 41 chooses one at a time from them, and controls. The speech recognition control section to which 44 performs the start of the recognition processing of the voice recognition part 5, a stop, and acquisition of a recognition result and the degree of coincidence, 45 from the recognition result and the degree of coincidence from the directive information and the speech recognition control section 44 from the directive control section 41. The coincidence degree judgment part which judges which directivity is the optimal, and 46 are decision result storage parts stores which memorize the decision result in the recognition result, the degree of coincidence, and the coincidence degree judgment part 45 in a voice recognition part, and the control section 4 consists of the above 41-46.

[0014]Next, operation is explained. Drawing 3 is a flow chart which shows the activity of the voice recognition equipment shown in drawing 1. In Step A0, initialization of each part of the control section 4 and start operation of processing are performed first. Next, in Step A1, directive setting out of the directive controller 3 is set as indirectivity by control from the directive control section 41. Next, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal in Step A2 is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, this audio signal is inputted into the directive controller 3 set as indirectivity, and the output of the directive controller 3 is inputted into the voice recognition part 5. In the voice recognition part 5, the keyword used as the start command of voice operation, for example, the processing which recognizes "a recognition start", is performed by control from the speech recognition control section 44 to the inputted audio signal.

[0015]Next, in step A3, based on the recognition result of the voice recognition part 5, the speech recognition control section 44 returns to Step A2, when it judges whether the keyword "a recognition start" has been recognized and it has not been recognized, and it performs voice input processing and keyword recognition processing again. When recognized, it progresses to step A4. Next, when it progresses to step A4, by control from the sound buffer control section 43, the voice input to the sound buffers 2a-2c is suspended, and the audio signal when the keyword "a recognition start" has been recognized is stored.

[0016]Next, in step A5, by control from the directive control section 41, the directive information storage part 42 memorized, for example, directive setting out of the directive controller 3 is set up in the direction of 0 degree of transverse planes. Next, the audio signal of the keyword "a recognition start" stored in the sound buffers 2a-2c by step A4 in Step A6, Reproduce by control from the sound buffer control section 43, and an audio signal with the directivity which the directive control section 41 set up by the directive controller 3 is generated, Keyword recognition processing is again performed by the voice recognition part 5, and the speech recognition control section 44 acquires the result of recognition processing, and the degree of coincidence from the voice recognition part 5, and transmits to the coincidence degree judgment part 45. The coincidence degree judgment part 45 transmits to the decision result storage parts store 46, and makes the directive information, the recognition result, and the degree of coincidence which are set up now memorize.

[0017]Next, in Step A7, when the new recognition processing about all the directivity and the acquisition of a recognition result and the degree of coincidence which were memorized by the directive information storage part 42 are not completed, it returns to step A5, and it repeats until it ends about all the directivity memorized by the directive information storage part 42. When new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the directivity, it progresses to Step A8.

[0018]Next, the recognition result about all the directivity and the degree of coincidence to the coincidence degree judgment part 45 memorized by the decision result storage parts store 46 when it progressed to Step A8, Judging which a recognition result is a correct answer "a recognition start", i.e., a keyword, and is the directivity with the highest degree of coincidence, the directive control section 41 controls the directive controller 3 to become the directivity which the coincidence degree judgment part 45 judged.

[0019]Next, in step A9, the voice input to the sound buffers 2a-2c stopped by step A4 is resumed. Namely, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, an audio signal is inputted into the directive controller 3 which a recognition result is a correct answer at Step A8, and was set as directivity with the highest degree of coincidence, and the output of the directive controller 3 is inputted into the voice recognition part 5. In the voice recognition part 5, processing which recognizes the recognized vocabulary stored in the speech recognition dictionary part 6 by the control from the speech recognition control section 44 is performed to the inputted audio signal. Next, in Step A10, the voice recognition part 5 outputs the result of recognition processing, and operates the audio equipment besides a graphic display, etc. At Step A8, if the completion of recognition of a keyword "a recognition start" and a directive set direction are displayed with the display or lamp besides a graphic display, a speaker can check the display and the command which continues by step A9 can be inputted.

[0020]In the voice recognition method of Embodiment 1, and a device as mentioned above, In order to change directivity using the audio signal of the sound buffer at the time of having recognized the keyword "a recognition start", to judge the direction of a speaker from the degree of coincidence in speech recognition and to extract a speaker's sound, When the direction of a speaker has not become settled, it is possible to extract a speaker's sound effectively and to recognize it. Cost reductions of a speaker's direction detecting means, such as a switch for speaker distinction or a sensor for direction detection, become it is unnecessary and possible.

[0021]Embodiment 2. drawing 4 is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 2. According to this embodiment, in addition to the method of changing the directivity performed by Embodiment 1 and choosing the greatest thing of the degree of coincidence, the method of changing a gain change, i.e., a signal level, and seeing the degree of coincidence is used. In drawing 4, it replaced with the directive controller 3, the directive control section 41, and the directive storage parts store 42 of drawing 1, and the directional gain controller 31, the directional gain control section 47, and the directional gain storage parts store 48 are formed, respectively.

[0022]The directional gain controller which outputs the audio signal which 31 adjusted the audio signal held by the sound buffer part 2 in drawing 4, and changed directivity and a profit, The directional gain control section by which 47 controls the directivity in the directional gain controller 31, and change of a profit, While 48 is a directional gain information storage part which memorizes two or more directive information and two or more profit information in the directivity of the directional gain control section 47, and control of a profit, for example, makes a transverse plane 0 degree and memorizing even **90 at intervals of 5 degrees, The initial profit was 0 dB and even **15 dB is memorized at intervals of 3 dB.

[0023]The voice recognition part 5 performs speech recognition processing to the audio signal which had directivity and a profit changed by the directional gain controller 31. The coincidence degree judgment part 45 judges which directivity and profit are the optimal from the recognition result and the degree of coincidence from the directive information, profit information, and the speech recognition control section 44 from the directional gain control section 47. The control section 4 comprises 43-48. Since other portions are the same as that of drawing 1, explanation is omitted.

[0024]Next, operation is explained. Drawing 5 is a flow chart which shows the activity of the voice recognition equipment shown in drawing 4. In Step B0, initialization of each part of the control section 4 and start operation of processing are performed first. Next, in Step B1, the directivity of the directional gain controller 31 and a gain setting are set as indirectivity and an initial profit by control from the directional gain control section 47. Next, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal in step B-2 is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, this audio signal is inputted into the directional gain controller 31 set as indirectivity and an initial profit, and the output of the directional gain controller 31 is inputted into the voice recognition part 5. In the voice recognition part 5, the keyword used as the start command of voice operation, for example, the processing which recognizes "a recognition start", is performed by control from the speech recognition control section 44 to the inputted audio signal.

[0025]Next, in Step B3, based on the recognition result of the voice recognition part 5, when it judges whether the keyword "a recognition start" has been recognized and it has not been recognized, the speech recognition control section 44 returns to step B-2, and performs voice input processing and keyword recognition processing again. When recognized, it progresses to step B4. Next, when it progresses to step B4, by control from the sound buffer control section 43, the voice input to the sound buffers 2a-2c is suspended, and the audio signal when the keyword "a recognition start" has been recognized is stored.

[0026]Next, in step B5, by control from the directional gain control section 47, directive setting out of the directional gain controller 31 is set up in the direction of 0 degree of transverse planes, for example, the directional gain information storage part 48 memorized. Next, in step B6, the audio signal of the keyword "a recognition start" stored in the sound buffers 2a-2c by step B4 is reproduced by control from the sound buffer control section 43, An audio signal with the directivity which the directional gain control section 47 set up by the directional gain controller 31 is generated, keyword recognition processing is again performed by the voice recognition part 5, and the speech recognition control section 44 acquires the result of recognition processing, and the degree of coincidence from the voice recognition part 5, and transmits to the coincidence degree judgment part 45. The coincidence degree judgment part 45 transmits to the decision result storage parts store 46, and makes the directive information, the recognition result, and the degree of coincidence which are set up now memorize.

[0027]Next, when the new recognition processing about all the directivity and the acquisition of a recognition result and the degree of coincidence which were memorized by the directional gain information storage part 48 are not completed in Step B7, it returns to step B5, It repeats until new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the directivity memorized by the directional gain information storage part 48. When new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the directivity, it progresses to Step B8.

[0028]Next, the recognition result about all the directivity and the degree of coincidence to the coincidence degree judgment part 45 memorized by the decision result storage parts store 46 when it progressed to Step B8, Judging which a recognition result is a correct answer "a recognition start", i.e., a keyword, and is the directivity with the highest degree of coincidence, the directional gain control section 47 controls the directional gain controller 31 to become the directivity which the coincidence degree judgment part 45 judged.

[0029]Next, in Step B9, by control from the directional gain control section 47, the directional gain information storage part 48 memorized, for example, the gain setting of the directional gain controller 31 is set as a profit higher 3 dB than an initial profit. A profit shall be adjusted only about the directive direction the gain control in this case was judged at Step B8 to be.

[0030]Next, in Step B10, the audio signal of the keyword "a recognition start" stored in the sound buffers 2a-2c by step B4 is reproduced by control from the sound buffer control section 43, An audio signal with the directivity and profit which the directional gain control section 47 set up by the directional gain controller 31 is generated, keyword recognition processing is again performed by the voice recognition part 5, and the speech recognition control section 44 acquires the result of recognition processing, and the degree of coincidence from the voice recognition part 5, and transmits to the coincidence degree judgment part 45. The coincidence degree judgment part 45 transmits to the decision result storage parts store 46, and makes the directive information, the profit information, the recognition result, and the degree of coincidence which are set up now memorize.

[0031]Next, in Step B11, Until the new recognition processing and the acquisition of a recognition result and the degree of coincidence to all the profits which returned to Step B9 and were memorized by the directional gain information storage part 48 are completed, when the new recognition processing about all the profits and the acquisition of a recognition result and the degree of coincidence which were memorized by the directional gain information storage part 48 are not completed. It repeats. When new recognition processing and acquisition of a recognition result and the degree of coincidence are completed about all the profits, it progresses to Step B12.

[0032]Next, the recognition result about all the profits and the degree of coincidence to the coincidence degree judgment part 45 memorized by the decision result storage parts store 46 when it progressed to Step B12, Judging which a recognition result is a correct answer and is the profit with the highest degree of coincidence, the directional gain control section 47 controls the directional gain controller 31 to become the directivity and profit which the coincidence degree judgment part 45 judged.

[0033]Next, in Step B13, the voice input to the sound buffers 2a-2c stopped by step B4 is resumed. Namely, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, an audio signal is inputted into the directional gain controller 31 which a recognition result is a correct answer at Step B12, and was set as directivity and a profit with the highest degree of coincidence, and the output of the directional gain controller 31 is inputted into the voice recognition part 5. In the voice recognition part 5, processing which recognizes the recognized vocabulary stored in the speech recognition dictionary part 6 by the control from the speech recognition control section 44 is performed to the inputted audio signal. Next, in Step B14, the voice recognition part 5 outputs the result of recognition processing, and controls the audio equipment besides a graphic display, etc.

[0034]In the voice recognition method of Embodiment 2, and a device as mentioned above, In order to judge the direction of a speaker using the degree of coincidence in speech recognition, and also to judge the optimal input signal level for the optimal profit, i.e., speech recognition, using the degree of coincidence in speech recognition and to extract a speaker's sound, When the direction of a speaker has not become settled, while extracting a speaker's sound effectively, even when the voice input levels to a microphone differ for the distance from a speaker to a microphone, etc., it is possible to perform recognition processing with the optimal input signal level for speech recognition. Cost reductions of a speaker's direction detecting means, such as a sensor for direction detection, become it is unnecessary and possible.

[0035]Embodiment 3. drawing 6 is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 3. This embodiment shows the example which controls a navigation device by a sound. In addition to what was shown in drawing 4, drawing 6 shows the navigation device 7. In drawing 6, 7 is a navigation device with which various operations are performed by the control section 4 based on the result of speech recognition. Since others are the same as that of drawing 4, explanation is omitted.

[0036]Next, operation is explained. Drawing 7 is a flow chart which shows the activity of the voice recognition equipment shown in drawing 6. Since Steps C0-C12 are the same as Steps B0-B12 of drawing 5, explanation is omitted. However, although drawing 5 explained the example of the keyword as "a recognition start", in drawing 7, another keyword, for example, "navigation", is used.

[0037]In Step C13 following Step C12, the voice input to the sound buffers 2a-2c stopped at Step C4 is resumed. Namely, each signal which was inputted into the microphones 1a-1c, and was changed into the audio signal is stored in the sound buffers 2a-2c by control from the sound buffer control section 43, This stored audio signal is reproduced by control from the sound buffer control section 43, an audio signal is inputted into the directional gain controller 31 which a recognition result is a correct answer at Step C12, and was set as directivity and a profit with the highest degree of coincidence, and the output of the directional gain controller 31 is inputted into the voice recognition part 5. In the voice recognition part 5, processing which recognizes "the control-commands vocabulary of the navigation device 7 stored in the speech recognition dictionary part 6 by the control from the speech recognition control section 44, for example, "a detailed display", a broader-based display", "destination setting", etc. is performed to the inputted audio signal.

[0038]Next, in Step C14, the speech recognition control section 44 acquires the recognition result of the voice recognition part 5, for example, "a detailed display", and transmits the control signal corresponding to a recognition result "a detailed display" to the navigation device 7. Next, in Step C15, processing which indicates the display screen by detailed according to the control signal corresponding to the recognition result "a detailed display" which the navigation device 7 received is performed.

[0039]In the voice recognition method of Embodiment 3, and a device as mentioned above, Change directivity using the audio signal of the sound buffer at the time of having recognized the keyword "navigation", and the highest directivity of the degree of coincidence in speech recognition is judged, In order to perform speech recognition processing after making this into the direction of a speaker and judging the highest profit of the degree of coincidence further, it becomes it is unnecessary and simple operating the start switch of speech recognition. In order to judge the highest directivity and profit of the degree of coincidence in keyword recognition processing, The direction of a speaker cannot be limited to a driver, but the voice operation from a passenger seat of it can also become possible, recognition processing can be performed on the optimal directivity and profit in future command recognition processings, and improvement in recognition performance is possible. Cost reductions of a speaker's direction detecting means, such as a sensor for direction detection, become it is unnecessary and possible.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 1.
[Drawing 2]It is a top view showing the attaching position of the microphone of the voice recognition equipment of drawing 1.
[Drawing 3]It is a flow chart which shows the activity of the voice recognition equipment of drawing 1.
[Drawing 4]It is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 2.
[Drawing 5]It is a flow chart which shows the activity of the voice recognition equipment of drawing 4.
[Drawing 6]It is a block diagram showing the system configuration of the voice recognition equipment in this embodiment of the invention 3.
[Drawing 7]It is a flow chart which shows the activity of the voice recognition equipment of drawing 6.
[Drawing 8]It is a block diagram showing the system configuration of conventional voice recognition equipment.
[Drawing 9]It is a flow chart which shows the activity of the voice recognition equipment of drawing 8.
[Description of Notations]
1 A voice input part, 2 sound buffer parts, and 3 A directive controller and 5 Voice recognition part, 6 A speech recognition dictionary part and 31 [ A speech recognition control section and 45 / A coincidence degree judgment part and 46 / A decision result storage parts store, 47 directional-gain control section, and 48 / Directional gain information storage part. ] A directional gain controller and 41 A directive control section and 42 A directive information

storage part, 43 sound-buffer control section, and 44

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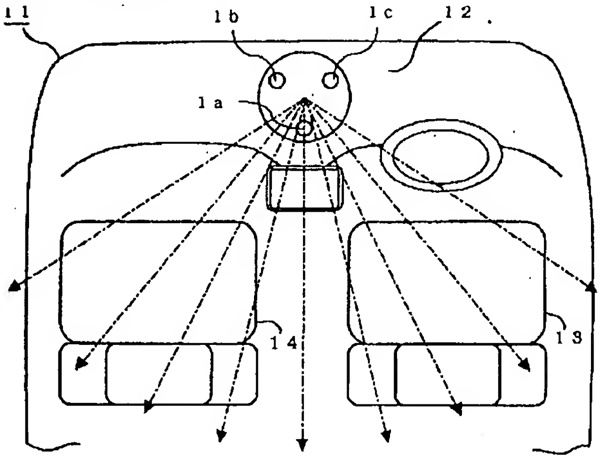
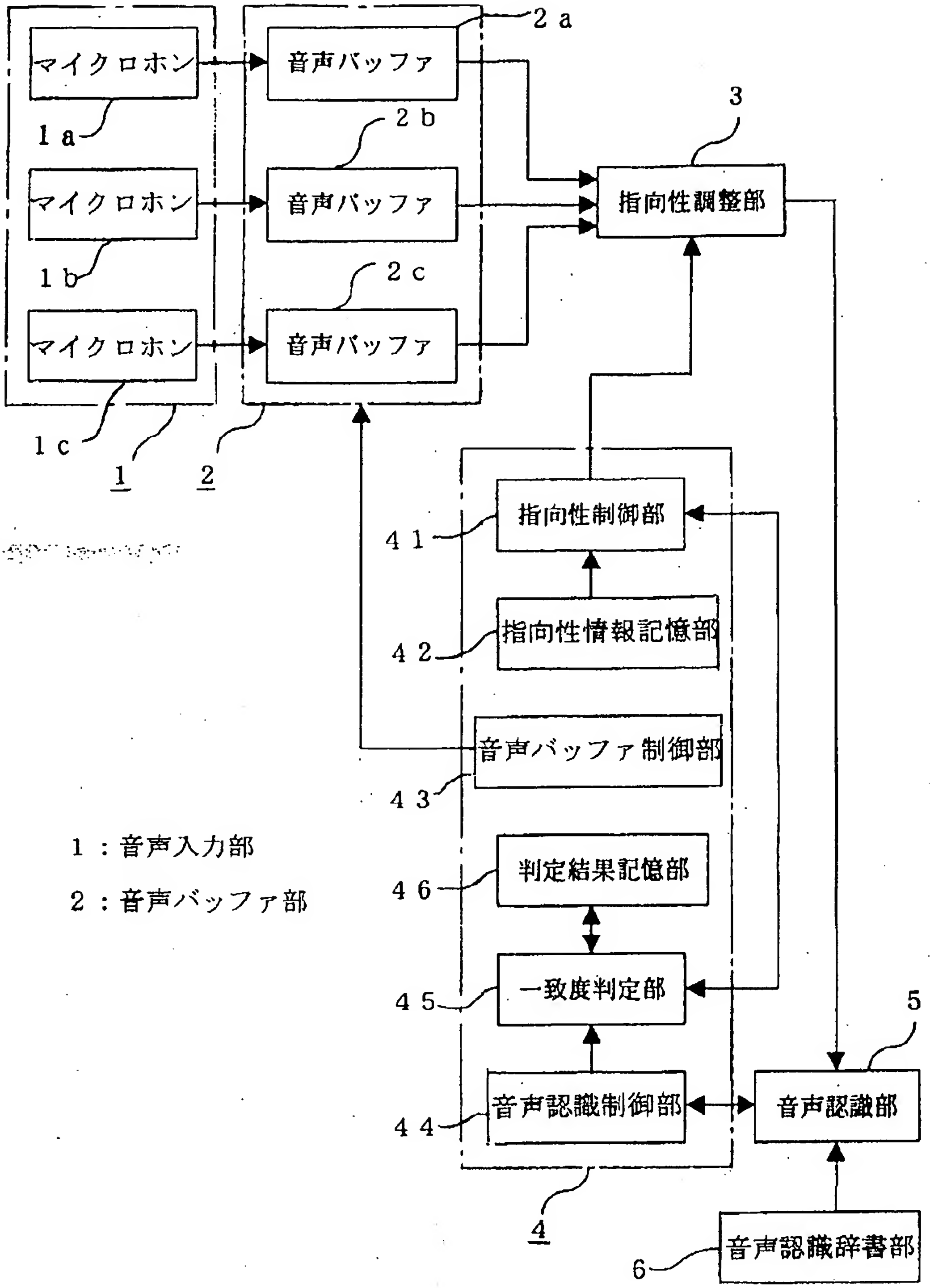
3.In the drawings, any words are not translated.

## DRAWINGS

[Drawing 2]



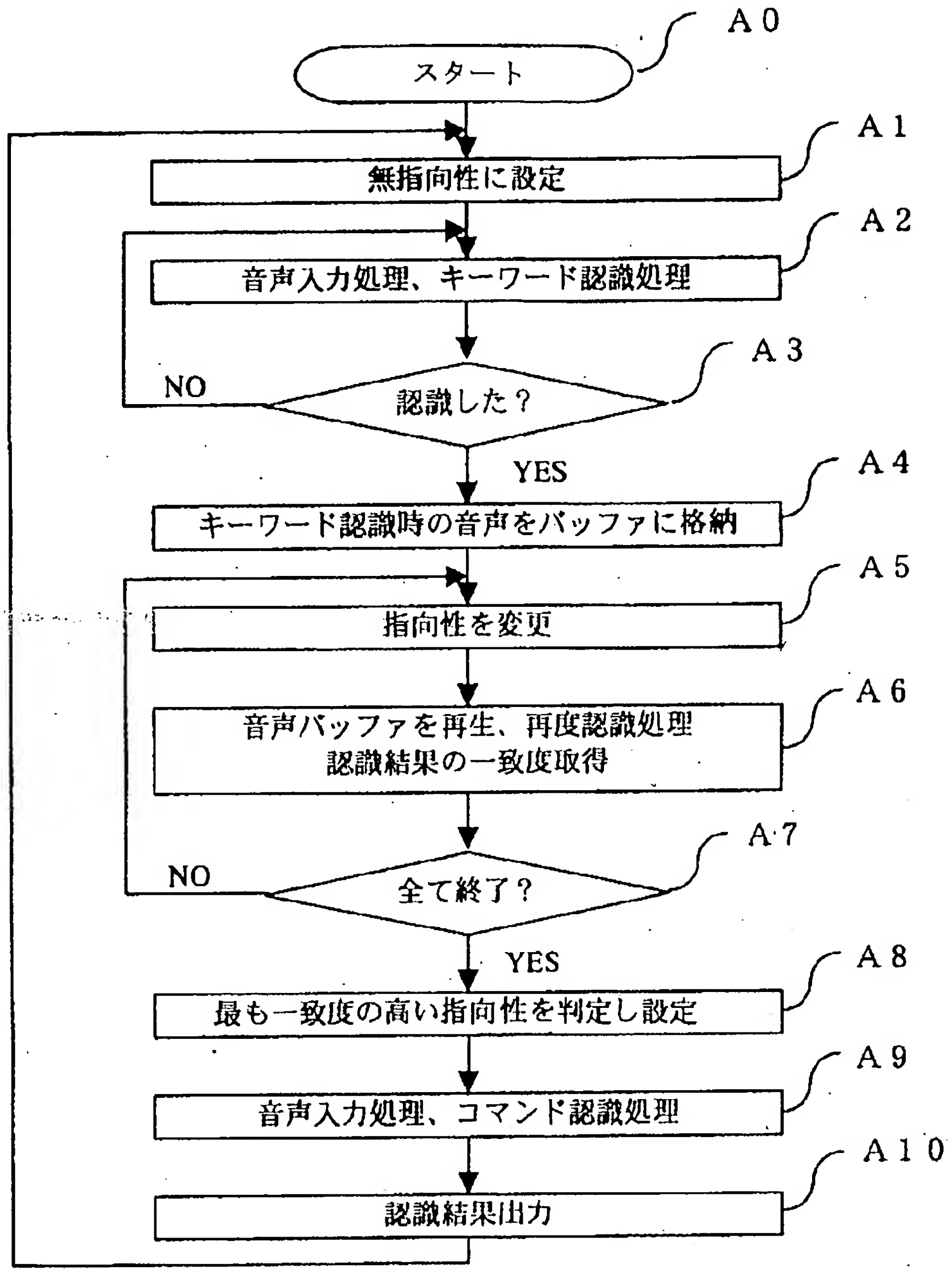
[Drawing 1]


マイクロホン
マイクロホン
マイクロホン
1 a
1 b
1 c
1
音声バッファ
音声バッファ
音声バッファ
2 a
2 b
2 c
2
3
指向性調整部
4 1
指向性制御部
4 2
指向性情報記憶部
4 3
音声バッファ制御部
4 6
判定結果記憶部
4 5
一致度判定部
4 4
音声認識制御部
4
5
音声認識部
6
音声認識辞書部

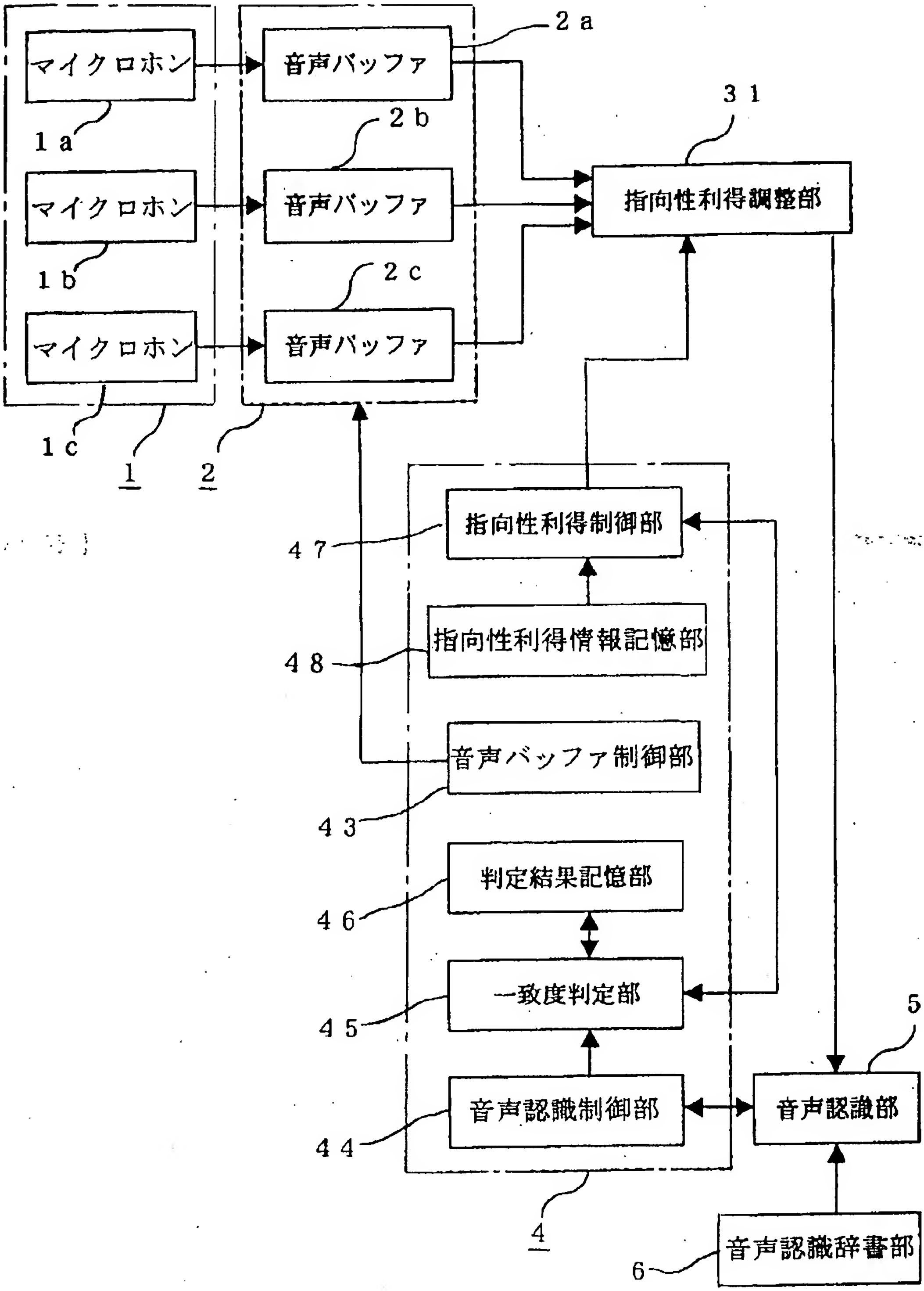
1 ：音声入力部

2 ：音声バッファ部

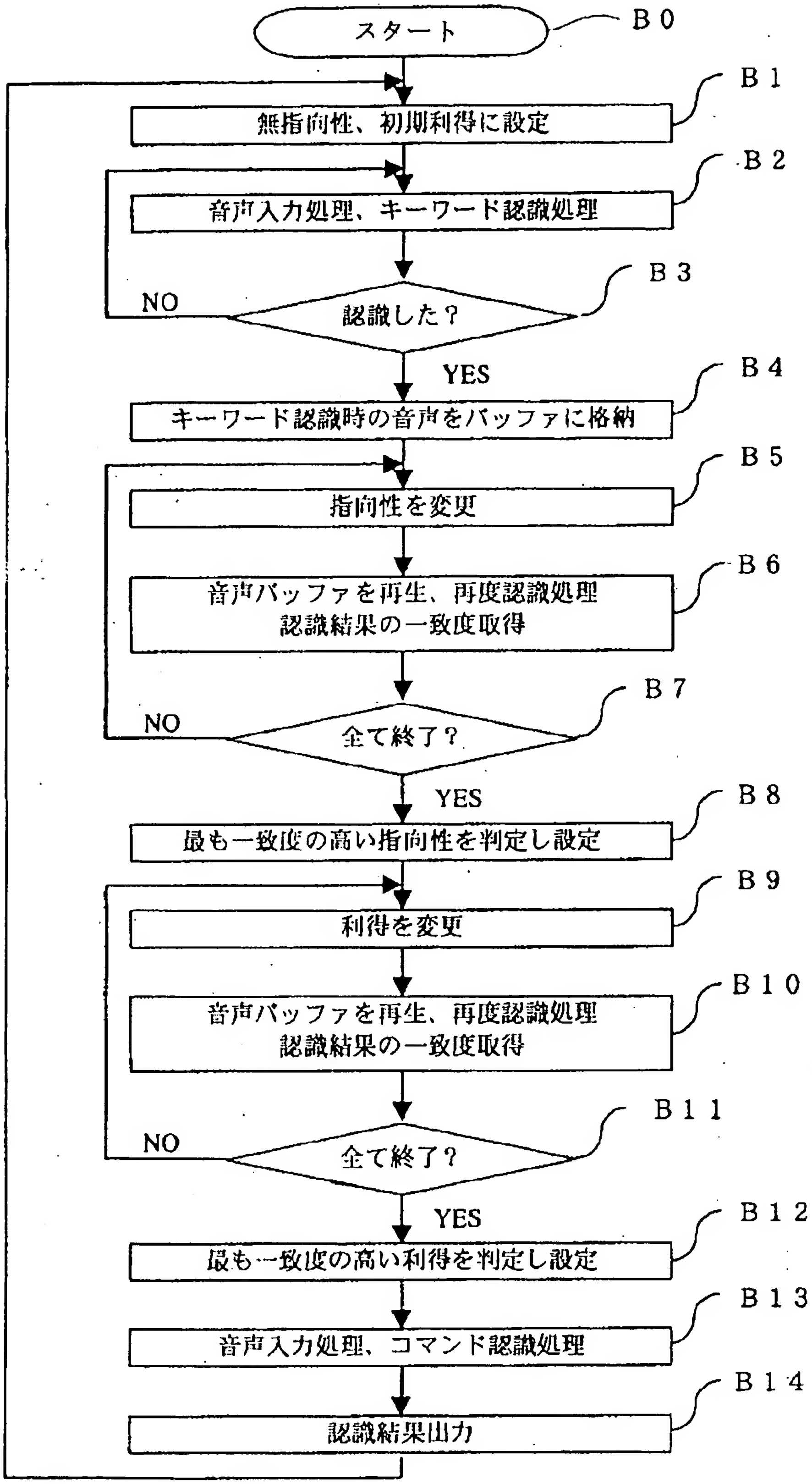
[Drawing 3]


A0
スタート
A1
無指向性に設定
A2
音声入力処理、キーワード認識処理
A3
認識した？
NO
YES
A4
キーワード認識時の音声をバッファに格納
A5
指向性を変更
A6
音声バッファを再生、再度認識処理
認識結果の一致度取得
A7
全て終了？
NO
YES
A8
最も一致度の高い指向性を判定し設定
A9
音声入力処理、コマンド認識処理
A10
認識結果出力

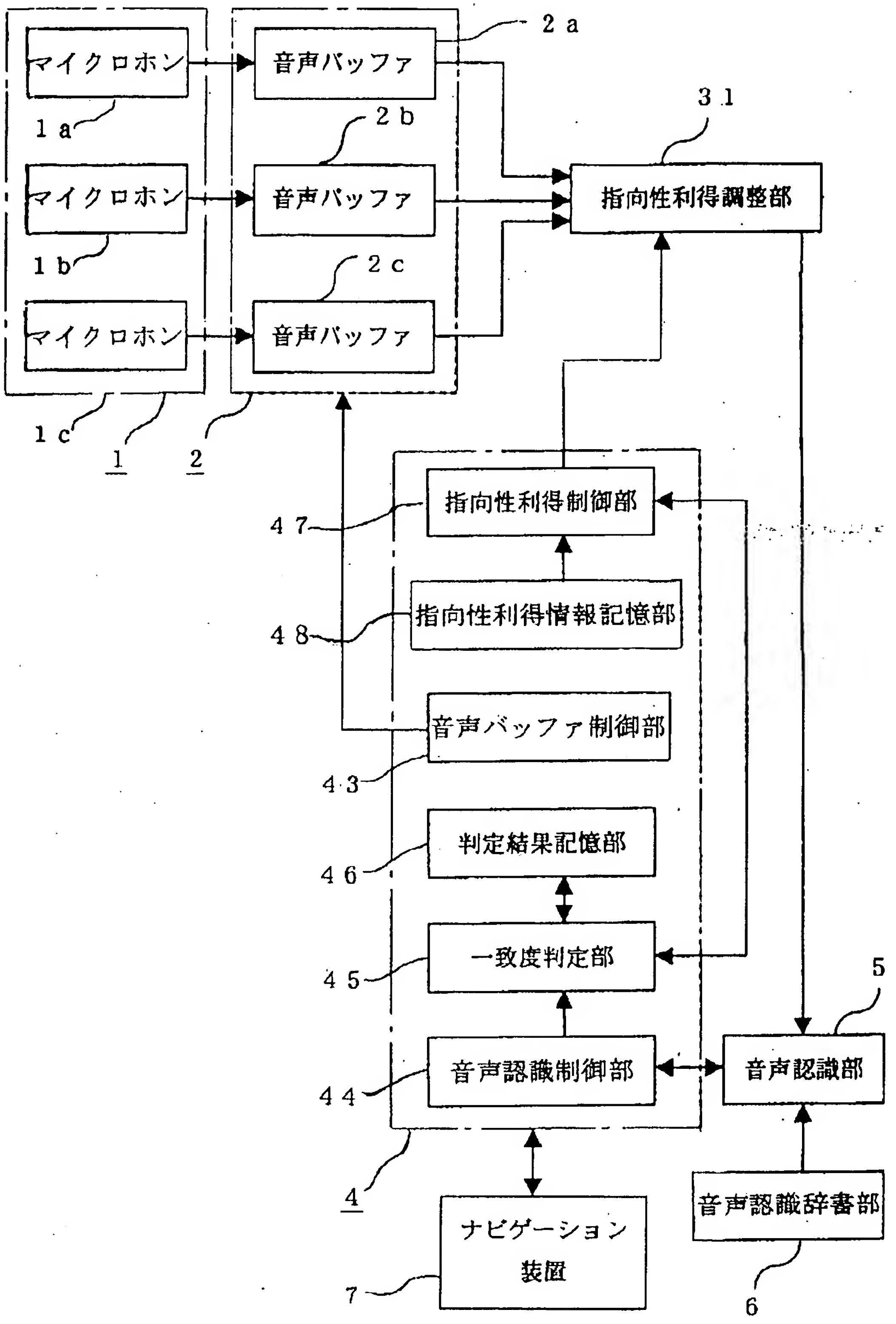
[Drawing 4]


マイクロホン
マイクロホン
マイクロホン
1a
1b
1c
1
音声バッファ
音声バッファ
音声バッファ
2a
2b
2c
2
31
指向性利得調整部
指向性利得制御部
47
指向性利得情報記憶部
48
音声バッファ制御部
43
判定結果記憶部
46
一致度判定部
45
音声認識制御部
44
4
音声認識部
5
音声認識辞書部
6

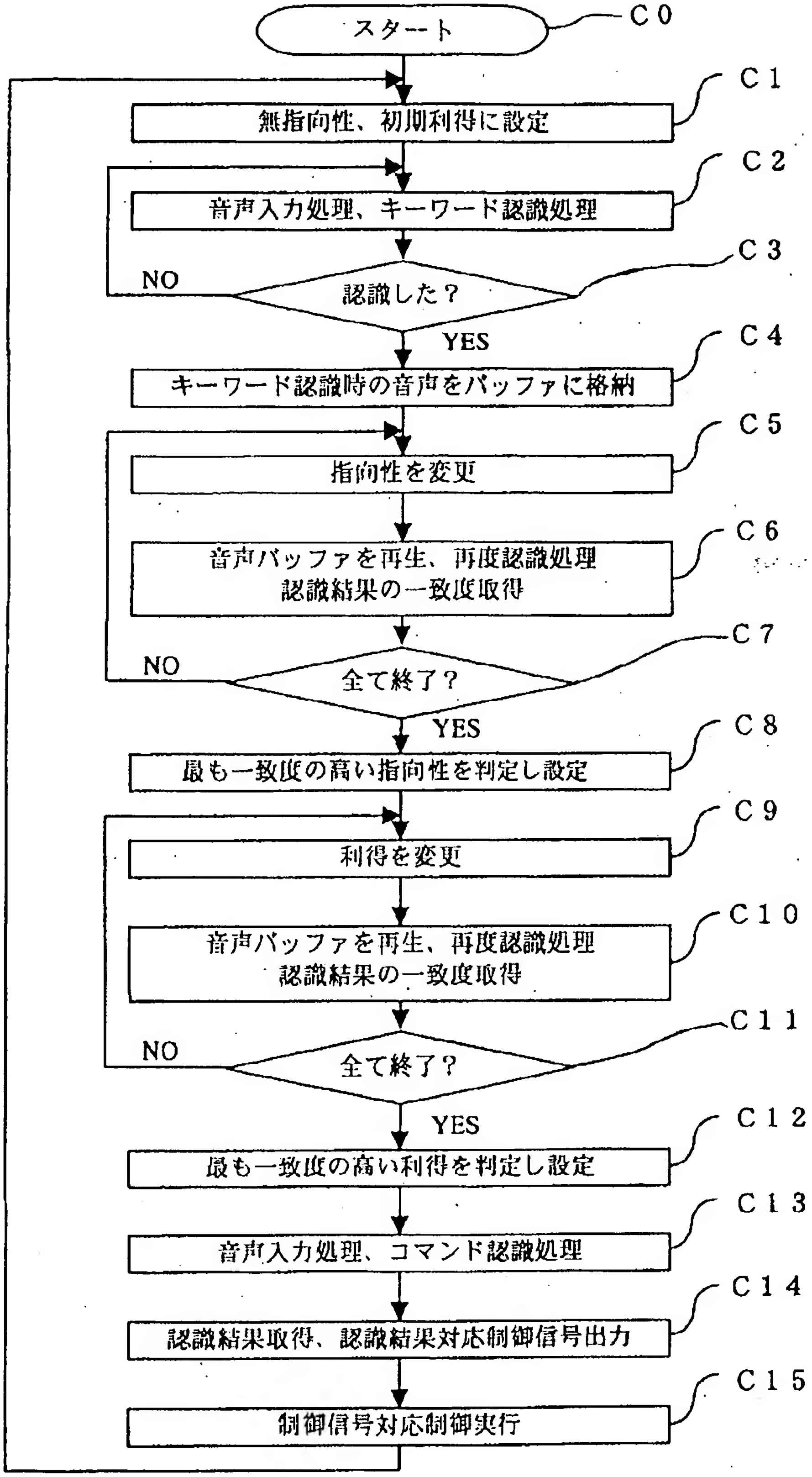
[Drawing 5]


スタート
B 0
無指向性、初期利得に設定
B 1
音声入力処理、キーワード認識処理
B 2
認識した？
B 3
NO
YES
キーワード認識時の音声をバッファに格納
B 4
指向性を変更
B 5
音声バッファを再生、再度認識処理
認識結果の一致度取得
B 6
全て終了？
B 7
NO
YES
最も一致度の高い指向性を判定し設定
B 8
利得を変更
B 9
音声バッファを再生、再度認識処理
認識結果の一致度取得
B 1 0
全て終了？
B 1 1
NO
YES
最も一致度の高い利得を判定し設定
B 1 2
音声入力処理、コマンド認識処理
B 1 3
認識結果出力
B 1 4

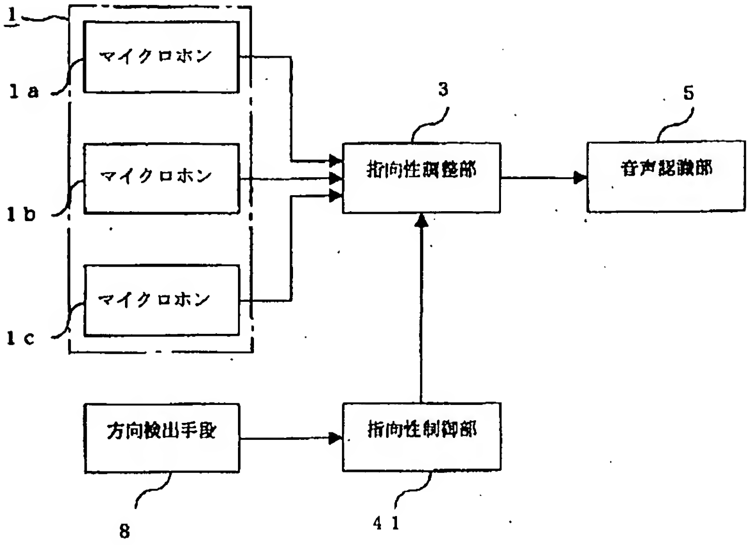
[Drawing 6]


マイクロホン
マイクロホン
マイクロホン
1 a
1 b
1 c
1
音声バッファ
音声バッファ
音声バッファ
2 a
2 b
2 c
2
3 1
指向性利得調整部
指向性利得制御部
4 7
指向性利得情報記憶部
4 8
音声バッファ制御部
4 3
判定結果記憶部
4 6
一致度判定部
4 5
音声認識制御部
4 4
4
5
音声認識部
音声認識辞書部
6
ナビゲーション
装置
7

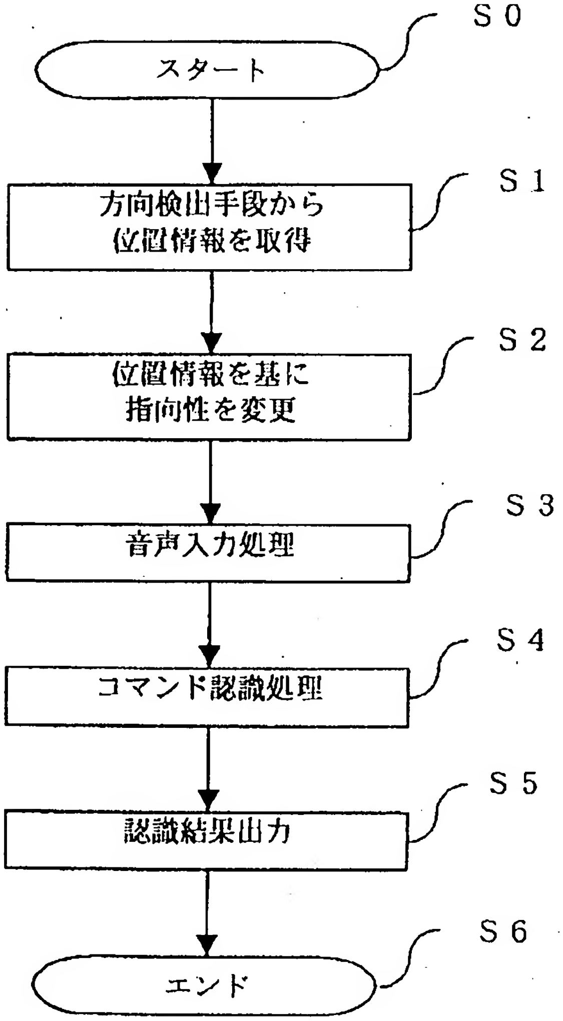
[Drawing 7]


スタート
C 0
無指向性、初期利得に設定
C 1
音声入力処理、キーワード認識処理
C 2
認識した？
C 3
NO
YES
キーワード認識時の音声をバッファに格納
C 4
指向性を変更
C 5
音声バッファを再生、再度認識処理
認識結果の一致度取得
C 6
全て終了？
C 7
NO
YES
最も一致度の高い指向性を判定し設定
C 8
利得を変更
C 9
音声バッファを再生、再度認識処理
認識結果の一致度取得
C 1 0
全て終了？
C 1 1
NO
YES
最も一致度の高い利得を判定し設定
C 1 2
音声入力処理、コマンド認識処理
C 1 3
認識結果取得、認識結果対応制御信号出力
C 1 4
制御信号対応制御実行
C 1 5

[Drawing 8]


1
マイクロホン
1a
マイクロホン
1b
マイクロホン
1c
3
指向性調整部
5
音声認識部
方向検出手段
8
指向性制御部
41

[Drawing 9]


S0
スタート
S1
方向検出手段から位置情報を取得
S2
位置情報を基に指向性を変更
S3
音声入力処理
S4
コマンド認識処理
S5
認識結果出力
S6
エンド

[Translation done.]